EPA

United States Environmental Protection Agency
Washington, DC 20460

Work Assignment

Work Assignment Number: 4-09

☐ Other ☐ Amendment Number:

Contract Number	Contract Period	Title of Work Assignment/SF Site Name
EP-D-11-006	04/29/2011 To 03/31/2015 Base Option Period Number 3	Develop Mexico Future Emission

Contractor: EASTERN RESEARCH GROUP, INC.

Specify Section and paragraph of Contract SOW:

Purpose:
- [X] Work Assignment
- [ ] Work Assignment Amendment
- [X] Work Plan Approval
- [ ] Work Assignment Close-Out
- [ ] Incremental Funding

Period of Performance: From 06/20/2014 To 03/31/2015

Comments:
The work plan dated 07/22/14 has been reviewed and we concur with the labor mix, technical hours (365), ODCs, total estimated cost $36,241 and completion date 03/31/15 as specified. Please see attachment for work plan edits. Also, the WAM is now Alison Eyth and the Alt is Lee Tooly. No previous performed work shall be duplicated.

☐ Superfund — Accounting and Appropriations Data — [X] Non-Superfund

Note: To report additional accounting and appropriations data use EPA Form 1900-69A

SFO (Max 2): ☐

S	DCN (Max 6)	Budget/FY (Max 4)	Appropriation Code (Max 6)	Budget Org/Code (Max 7)	Program Element (Max 9)	Object Class (Max 4)	Amount (Dollars)	(Cents)	Site/Project (Max 8)	Cost Org/Code (Max 7)
1										
2										
3										
4										
5										

Authorized Work Assignment Ceiling

	Cost/Fee	LOE
Contract Period 04/29/2011 To 03/31/2015	$0.00	0
This Action	$36,241.00	365
Total	$36,241.00	365

Work Plan / Cost Estimate Approvals

	Cost/Fee	LOE
Contractor WP Dated 07/22/2014	$36,241.00	365
Cumulative Approved	$36,241.00	365

Work Assignment Manager Name: Lee Tooly (Signature) (Date)	Branch/Mail Code: Phone Number: 919-541-5292 FAX Number:
Project Officer Name: Margaret Dougherty (Signature) (Date)	Branch/Mail Code: Phone Number: 919-541-2344 FAX Number:
Other Agency Official Name: (Signature) (Date)	Branch/Mail Code: Phone Number: FAX Number:
Contracting Official Name: Rodney-Daryl Jones Rodney-Daryl Jones (Signature) AUG 07 2014 (Date)	Branch/Mail Code: Phone Number: 919-541-3112 FAX Number:

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EP-D-11-006	04/29/2011 To 03/31/2015 Base Option Period Number 3	K

Contractor	Specify Section and paragraph of Contract SOW
EASTERN RESEARCH GROUP, INC.	Develop Mexico Future Year Emissions

Purpose:
- [X] Work Assignment
- [ ] Work Assignment Amendment
- [ ] Work Plan Approval
- [ ] Work Assignment Close-Out
- [ ] Incremental Funding

Period of Performance: From 06/20/2014 To 03/31/2015

Comments:
This is the initiation of a work assignment for the Option III period. Hours have been authorized for the work plan and also for work to begin (100 hours). This work does not duplicate any work previously performed or is currently being performed.

☐ Superfund — Accounting and Appropriations Data — [X] Non-Superfund

Note: To report additional accounting and appropriations data use EPA Form 1900-69A.

SFO (Max 2): ☐

Line	DCN (Max 6)	Budget/FY (Max 4)	Appropriation Code (Max 6)	Budget Org/Code (Max 7)	Program Element (Max 9)	Object Class (Max 4)	Amount (Dollars)	(Cents)	Site/Project (Max 8)	Cost Org/Code (Max 7)
1										
2										
3										
4										
5										

Authorized Work Assignment Ceiling

	Cost/Fee	LOE
Contract Period 04/29/2011 To 03/31/2015		
This Action		
Total		

Work Plan / Cost Estimate Approvals

	Cost/Fee	LOE
Contractor WP Dated		
Cumulative Approved		

Work Assignment Manager Name: Lee Tooly (Signature) (Date)	Branch/Mail Code	
	Phone Number: 919-541-5292	
	FAX Number:	
Project Officer Name: Margaret Dougherty (Signature) (Date)	Branch/Mail Code	
	Phone Number: 919-541-2344	
	FAX Number:	
Other Agency Official Name (Signature) (Date)	Branch/Mail Code	
	Phone Number:	
	FAX Number	
Contracting Official Name: Rodney Daryl Jones (Signature) JUL 02 2014 (Date)	Branch/Mail Code	
	Phone Number: 919-541-3112	
	FAX Number	

Work Assignment Form (WebForms v1.0)

STATEMENT OF WORK

I. **Title:** Develop Mexico Future Year Emissions for use in EPA's Air Emissions Modeling Platform
Contractor Name: Eastern Research Group
Contract #: EP-D-11-006
WA #: 4-09
WAM: Lee Tooly, 919/541-5292
Alt WAM: Alison Eyth, 919/541-2478

II. **Project Background:**

The U.S. Environmental Protection Agency (EPA) developed an air quality modeling platform for the year 2011 based on the 2011 National Emissions Inventory, version 1 (2011NEIv1). The air quality modeling platform consists of all the emissions inventories and ancillary data files used for emissions modeling, as well as the meteorological, initial condition, and boundary condition files needed to run the air quality model. This 2011 modeling platform includes all criteria air pollutants and precursors (CAPs) and several of the hazardous air pollutants (HAPs). The first use of the 2011 platform is for the proposed rule related to the transport of ozone that will focus on helping states in the eastern United States meet the 2008 National Ambient Air Quality Standards (NAAQS) for ozone. The air quality model used for this rule is the Comprehensive Air Quality Model with Extensions (CAMX) model (http://www.camx.com/), version 6.10; however, emissions are first processed for the Community Multiscale Air Quality (CMAQ) model (http://www.epa.gov/AMD/CMAQ/), version 5.0.1 and then converted to CAMX-ready format. Both CAMX and CMAQ support modeling ozone and particulate matter, and require as input hourly and gridded emissions of chemical species that correspond to CAPs and specific HAPs. The 2011 platform consists of several 'complete' emissions cases: the 2011 base case the 2018 base case, and the 2025 base case. The purpose of the 2011 base case is to represent the year 2011 in a manner consistent with the methods used in corresponding future - year cases, including the 2018 and 2025 future year base cases, as well as any additional future year control and source apportionment cases. The current modeling platform, 2011 Version 6, is expected to be updated in the future as additional data and methods become available.

The primary emissions modeling tool used to create the air quality model-ready emissions was the SMOKE modeling system (http://www.smoke-model.org/). SMOKE version 3.5.1 was used to create emissions files for a 12-km national grid that includes all of the contiguous states. Boundary conditions for this grid were obtained from a 2011 run of GEOS - Chem (http://geos-chem.org/). Electronic copies of the data used as input to SMOKE for the 2011 Platform are made available on the Emissions Modeling Clearinghouse website, http://www.epa.gov/ttn/chief/emch/. The Technical Support Document (TSD) for the 2001 v6 modeling platform (http://www.epa.gov/ttn/chief/emch/2011v6/outreach/2011v6_2018base_EmisMod_TSD_26feb2014.pdf) describes the activities involved to process the base year and future year emissions for inputs to the air quality modeling.

The modeling domain includes portions of Mexico and Canada, and representative emissions for those areas are included. The emissions for Mexico used in the current modeling platform are very dated – they are 1999 year data that has been grown / projected to year 2012, and include emissions for stationary point and non-point sources and for mobile on-road and nonroad sources.

Eastern Research Group (ERG) has over the last few years for various clients, supported the acquisition of a 2008 inventory from Mexico and improvements to that inventory, as well as the projection of that inventory to future years for the purpose of including in regional near-border air quality modeling exercises. Previous clients have included the WRAP (Western Regional Air Partnership), TCEQ (Texas Commission on Environmental Quality), and most recently - the Maricopa County, Arizona Association of Governments (AOG).

Previous work by ERG on the 2008 Mexico inventory included identification of some quality issues, e.g., locational parameters for point source facilities. Some of the locational parameters for point sources were corrected and other locational improvements were noted as potential for future work. As part of the work for the Maricopa AOG, ERG obtained a 2008 emissions inventory from Mexico with more comprehensive geographic coverage and for northern portions of Mexico developed future year 2011 and 2015 emissions for criteria pollutant emissions. Black carbon emissions were also characterized to a limited extent. ERG has worked with representatives of Mexico federal environmental ministry (Secretariat of Environment and Natural Resources - SEMARNAT) and some municipal governments to obtain the 2008 emissions inventory. From ERG discussion with SEMARNAT officials in early 2014, it is understood that Mexico is in the process of developing a 2011 emissions inventory.

PURPOSE/OBJECTIVE

The purpose of this work assignment is to improve and replace the Mexico emissions inventory for criteria pollutants that is currently used in EPA's 2011 emissions modeling platform - with data that are representative of more recent conditions. The intended outcome is to develop a 2018 emissions inventory for Mexico from the updated 2008 base inventory that represents the significant emissions in the geographic areas included in the air quality modeling domain, and to provide the emissions data in a format that EPA can readily further process in the SMOKE tool during a future update of the 2011 emissions modeling platform.

Specific objectives include:

- Make and document improvements to the 2008 Mexico inventory that are the most immediately feasible and relevant to air quality modeling
- Develop 2018, 2025, and 2030 emissions using the updated 2008 base inventory
- Document the preparation of the inventories
- Provide data in format compatible with EPA's SMOKE tool
- Describe areas of the 2008 and corresponding future year inventories that are of limited quality for the intended use

III. STATEMENT OF WORK (SOW):

Deliverables in each task depend on successful completion of the preceding task. The contractor shall initiate work in subsequent tasks through Technical Direction (TD) by the WAM to proceed.

Task 1: Work Plan, Cost Estimate, and Project Monitoring

The contractor shall prepare a work plan describing the technical approach for each of the tasks in this work assignment. In addition the contractor shall provide a cost and labor estimate for the total work assignment and the cost and labor required to complete each of the work assignment tasks. The contractor shall plan for biweekly technical conference calls to brief the WAM and EPA team on progress or issues to complete each task. Monthly progress reports are required by the contract deliverables. Monthly reports must contain a summary of technical progress and work assignment cost information as required by the contract.

The contractor shall prepare a work plan, submit monthly progress reports, provide P-level estimates of resources for each task and subtask in any provided cost estimate, review and quality assure all work products, and keep the WAM informed of any problems that may impede project performance or delivery dates, along with any corrective actions needed by the Contractor or the WAM to solve such problems.

This has been determined to be a "Category III" project for quality control and assurance purposes, based on the OAQPS Quality Management Plan (QMP). Category III projects include environmental data operations (EDOs) performed as interim steps in a larger group of operations. Such projects include those producing results that are used to evaluate and select options for interim decisions or to perform feasibility studies or preliminary assessments of unexplored areas for possible future work. *The contractor shall include the quality assurance project plan (QAPP) within the work plan that is consistent with the category III requirements. Section V of this SOW outlines the expected elements of the QAPP considered sufficient for purpose of this project and inclusion in the workplan.* All deliverables of software and data need to be provided with documentation of the quality assurance steps and metrics that allow the WAM to confirm that the quality assurance steps have been performed. A separate and final QAPP report is not required but rather the documentation of the results of QA steps as outlined in the QAPP shall be included as part of the Task deliverables below.

Task 2: Make and Document Improvements to the 2008 Mexico Emissions Inventory

The contractor shall first provide a profile of the existing available 2008 Mexico emissions inventory to include a description of, but not limited to, the following:

- geographic coverage level of spatial resolution
- key emission categories and sectors with associated emissions per geographic area
- pollutants for which emissions are characterized
- assessment of quality which at least addresses the following -
    - portions of the inventory that are immediately feasible for substantial improvement
    - portions of the inventory that are of limited quality and not as feasible for immediate improvement
    - missing sector and pollutant emissions for affected geographic areas that in the aggregate are expected to be significant

Immediate improvements with significant benefit to processing emissions for air quality modeling may include but are not limited to the following:

- Focus data improvements on the priority geographic areas needed for the air quality modeling domain
- Ensure key emission point and non-point emission sources are assigned to appropriate locations (spatial reference for further SMOKE processing)
- Characterize all applicable criteria pollutant emissions from key emission sources
- Improve emission release point locations using on-line tools such as Google Earth and municipio/ urban locality coordinates
- Improve stack parameter data via incorporation of source category code (SCC)-specific default values for release height, stack diameter, velocity and flow
- Review emissions of pollutants for completeness (e.g., VOC for evaporative sources, both PM_{10} and $PM_{2.5}$ for dust sources, and NOx plus other pollutants for combustion sources)
- Quality assure data outliers such as unusually high emissions, $PM_{2.5}$ larger than PM_{10}, inconsistent CO and NOx for combustion sources
- Resolve all emission process descriptions to SCCs presently active in the EPA's Emissions Inventory System (EIS), and which are required for successful SMOKE processing and cross-referencing.

The recommendation for the immediate and significant improvements shall include a description of the amount of technical resources required to achieve them.
The contractor shall also address the resources needed to provide the 2008 data in the format Flat File 2010 (FF10) which is compatible with SMOKE -- see
http://www.cmascenter.org/smoke/documentation/3.5.1/html/ch08s02s10.html#d0e44906.

Through TD by the WAM, the contractor shall make and document the agreed improvements made to the 2008 inventory. The documentation shall identify the affected areas of the inventory that were corrected/ improved. The documentation shall also include a table that summarizes the data results for each geographic area, e.g., municipo, the SCCs for specific pollutant emissions that are included in each SMOKE modeling sector, and the associated amount of emissions. Missing emission categories shall be identified if applicable for affected geographic areas. The emission modeling sectors with corresponding SCCs are referenced in the Technical Support Document (TSD) for the 2001 v6 modeling platform.

The resulting inventory data shall be provided in either the format Flat File 2010 (FF10) or alternative electronic format agreed by the WAM. Electronic provision of the data will include a confirmation that it has been positively tested to conform to the active FF10 format structure and code requirements.

Task 3: Develop Future Year Emissions from the Updated Base 2008 Mexico Emissions Inventory

The Contractor shall describe the information sources for the data that will be applied to the updated 2008 base inventory to project emissions to the years 2018, 2025, and 2030. An operating assumption is that it will be efficient to develop multiple years at once rather than to develop one projected inventory year initially, e.g., 2018, and then inventories for other years later, i.e., 2025 and 2030. All growth and control parameters including assumptions will be identified according to the year and the emission sector/ pollutant to which they will be applied. The pollutants covered in the projected emissions shall include the following pollutants to extent available in the 2008 base year inventory with explanation of exclusions if applicable: CO, NOx, SO_2, PM_{10}, $PM_{2.5}$, NH_3, VOC, and black carbon as PEC (pyrolytic elemental carbon). The documentation shall also include limitations that may be expected to affect the quality of the resultant future year projected emissions with recommendations for improvement. Limitations may include but are not limited to: missing emission categories for which emissions are expected to be significant; incomplete emissions characterization for key sectors; and no-growth assumptions for sectors without economic trend data.

While it is expected that the EPA will further process the resulting future year emissions inventories using the SMOKE tool, the contractor shall include any recommendations of improved and relevant Mexico-specific temporal, spatial, and chemical speciation profiles and the readily available sources of that data - that may improve the existing profiles applied by SMOKE. The existing profiles are referenced in the TSD for the 2011 v6 modeling platform.

Through TD by the WAM, the contractor shall compile and document the future year emissions inventories. The documentation shall describe how the data were developed from the 2008 base year inventory and include a qualitative assessment of the data quality and any expected limitations for EPA's successful emissions processing by SMOKE and subsequent air quality modeling. An electronic record of the future-year projection factors shall be provided as meta-data to accompany the future-year emission results. A profile of the future-year emissions shall be described by graphical or tabular summaries and include a table that lists for each geographic area, e.g., municipio, the SCCs and specific pollutant emissions that are included in each SMOKE modeling sector, and the associated amount of emissions. Missing emission categories shall be identified if applicable for affected geographic areas.

The resulting inventory data shall be provided in the electronic format Flat File 2010 (FF10) and include documentation confirming it has been positively tested to comply with the active FF10 format structure and code requirements as described at
http://www.cmascenter.org/smoke/documentation/3.5.1/html/ch08s02s10.html#d0e44906.

IV. SCHEDULE OF DELIVERABLES

DELIVERABLES	SCHEDULE	TASK
Work Plan, QAPP, and Cost Estimate	Within 20 days after effective date of this Work Assignment	Task 1
Project Monitoring: • Status report for on-going tasks • Progress report	 Every 2 weeks via email Monthly	
Make and Document Improvements to 2008 Mexico Emissions Inventory		Task 2
• Technical memo describing profile of existing 2008 Mexico EI, the recommended improvements, and technical resources needed	July 31, 2014	
• Updated 2008 MX emissions data in agreed electronic format with documentation of the improvements made and QA results	Aug 31, 2014	
Develop and Document Future Year Mexico Emissions Inventories		Task 3
• Technical memo describing how future year emissions will be prepared: ▪ the sources of information including all growth and control assumptions that will be used to project emissions to 2018, 2025, and 2030 ▪ any expected data limitations with recommendations for improvement ▪ recommendations of relevant Mexico-specific temporal, spatial, or chemical speciation profiles that may improve the existing profiles applied by SMOKE	September 15, 2014	
• The Future year Mexico emissions inventories: ▪ documentation on how the inventory was developed including any data limitations for expected uses ▪ electronic meta-data record of the projection factors ▪ profile of emissions with tabular and graphical descriptions ▪ emissions data in FF10 format	October 31, 2014	

V. Quality Assurance Project Plan

This has been determined to be a "Category III" project for quality control and assurance purposes, based on the OAQPS Quality Management Plan (QMP). Category III projects include environmental data operations (EDOs) performed as interim steps in a larger group of operations. Such projects include those producing results that are used to evaluate and select options for interim decisions. The EDOs in this work will include examination and improvement of an existing Mexico emission inventory for 2008; and development of projected year emissions from the improved 2008 inventory based on application of secondary data, e.g., economic growth statistics. The projected emission results will be input to a larger group of operations by the EPA's emissions modeling platform to spatially, temporally, and chemically resolve pollutant emissions for the entire air quality modeling domain, which includes the contiguous 48-state area of the U.S. and some portion of Mexico and Canada.

The essential components of the QAPP considered sufficient for this project are outlined below. The contractor shall use the outline to prepare the QAPP and as a guide to perform the quality control and

assurance operations. Previous sections of this SOW cover the project background, problem definition, task descriptions, and schedule of deliverables.

Quality Objectives and Criteria

For the tasks described in this SOW, the primary objectives to ensure a process and products of sufficient quality are that:

- The cost estimate is complete and accurately describes the scope of the work agreed upon with the WAM.
- Budgetary and technical information in the work plan and monthly reports are complete and correct.
- The sources of data, emissions category and pollutant coverage, and general approaches for the data improvement and development techniques are vetted and approved by the WAM and participating staff.
- Acquired and developed data are as complete and accurate as possible and limitations for intended uses are explicitly addressed.
- Data improvement and development methods are adequately reviewed and documented and accomplish the objectives of the task.
- Developed data products are adequately reviewed and documented and accomplish the objectives of the task.
- Draft and final documents accurately describe the data sources, data improvements made, data development techniques, and summarize the profile of the resultant data.
- Data products delivered in electronic format FF10 includes test documentation that confirms compliance with the format definition including valid code values and data element specifications.

The contractor shall provide clear and complete documentation that will verify data sources, operating assumptions, and facilitate reproduction of the results.

Data Acquisition and Development

The QAPP elements in this section are designed to ensure that appropriate methods for sampling, measurement and analysis, data collection, data handling, and quality control (QC) activities are implemented and documented. This project does not conduct any source testing or raw data collection activities, but rather operates on the existing 2008 emissions inventory data for Mexico previously acquired by the contractor, to make and document some appreciable improvements, and then apply sector-relevant growth data to generate future year emissions.

The contractor shall establish and maintain a project file pertaining to all data acquisition tasks, including scanned and hard copies of relevant pages from published books, documents, and reports, electronic files (originals), and copies of communications via e-mail. Quality control activities for acquired data include checking and verifying the accuracy and completeness of the data provided.

The contractor shall provide documentation of the 2008 Mexico inventory to extent it is readily available, including estimation methods used for major sectors and provide a profile of the data as described under Task 2, which includes a completeness evaluation and qualitative assessment of any limitations for the intended use. As described under Task 2, the contractor shall document the specific corrections made to improve the emissions characterization for representative 2008 conditions and to ensure the successful subsequent processing by the EPA's SMOKE tool.

The generation of the future year emissions will involve obtaining relevant economic growth data and control program information. As described under Task 3, the contractor shall document sources for the growth and control data that will be applied to the updated 2008 base inventory to generate future year emissions and describe the relevancy of the applied data to Mexico conditions. All growth and control parameters including

assumptions will be identified according to the future year and the emission sector/ pollutant to which they will be applied. Limitations that may be expected to affect the quality of the resultant future year projected emissions will be explicitly addressed in the documentation. The contractor shall document how the emissions data compiled for future years complies with the SMOKE tool data and format requirements in order to ensure successful processing by the EPA.

Assessment and Oversight

The contractor shall peer review work products internally prior to submittal to EPA for review and comment. This is particularly relevant to the data collation and formatting operations. While the oversight is not intended to be extensive, it should be enough to ensure that new data have been properly collated and formatted. The contractor shall retain a record of the steps used to collate and format the data, including a description of any issues that arose during the process.

The contractor shall prepare and submit Monthly Progress Reports to the WAM providing the status of the work being conducted. If, for any reason, the schedules, specifications, and/or procedures detailed in the work plan or QAPP cannot be accomplished, the contractor shall will advise the EPA WAM immediately. Upon notification, the EPA WAM and contractor Project Manager will determine an appropriate course of corrective action that will be implemented as rapidly as possible.

Data Verification and Validation Methods

Data verification is a consistent and systematic process that determines whether the data have been collected and developed in accordance with the QAPP – see Data Acquisition above. Data validation evaluates the technical usefulness of the verified data with respect to the planned objectives of the project. Data checking is used to assess the technical soundness of the data. The contractor shall perform the specific data checks listed under Task 2. Data checks are intended to accomplish the following:

- Accuracy of the emission calculations
- Clear and complete documentation
- Identify emissions information that is less certain and of more limited use
- Identify emission inaccuracies and outliers
- Assess data completeness relative to geographic coverage, emission sectors and pollutants, year of record.

Quality checks will be implemented after data collection, entry, and calculations are performed. Data may be checked by other members of the contractor team who are knowledgeable of the emission sources, but have not been directly involved in the development of the task data. If errors are found, corrective action will be taken and documented.